

REMARKS

Applicants appreciate the Examiner's thorough examination of the present application as evidenced by the Office Action of May 4, 2004 (hereinafter "Office Action"). In response, Applicants have amended independent Claim 14 to clarify that the cobalt layer is directly on the bottom and inner walls of the contact hole and have amended independent Claim 23 to clarify that the plug is a unitary plug. Applicants respectfully submit that the cited references do not disclose, teach, or suggest all of the recitations of independent Claims 14 and 23 as amended. Accordingly, Applicants submit that all pending claims are in condition for allowance. Favorable reconsideration of all pending claims is respectfully requested for at least the reasons discussed hereafter.

Independent Claim 14 is Patentable

Independent Claim 14 stands rejected under 35 U.S.C. §102(b) as being anticipated by U. S. Patent No. 6,091,148 to Givens et al. (hereinafter "Givens"). A claim is anticipated under 35 U.S.C. §102, if each claimed element is found in a single prior art reference.

Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1576 (Fed. Cir. 1991); *Carella v. Starlight Archery and Pro Line Co.*, 804 F.2d 135, 138 (Fed. Cir. 1986). There must be no difference between the claimed invention and the reference disclosure, as viewed by an ordinary artisan. *Scripps Clinic & Research Foundation v. Genetech, Inc.*, 927 F.2d at 1576.

Independent Claim 14 is directed to a method of forming a metal contact in a semiconductor device and recites, in part:

forming an insulating layer having a contact hole therein on a silicon substrate;

forming a cobalt layer directly on a bottom and inner walls of the contact hole;

...

This aspect of the present invention is illustrated, for example, in FIG. 5A where the cobalt layer 207 is shown as being formed directly on the bottom and inner walls of the contact hole. Moreover, Applicants note that the Specification defines "directly on" at page 7, lines 5 and 6

as follows: "[i]n contrast, when an element, such as a layer, region, or substrate, is referred to as being "directly on" another element, there are no intervening elements present." The Office Action cites the PVD cobalt layer 34 of FIG. 2 of Givens as corresponding to the cobalt layer recited in Claim 14. (Office Action, page 2). In sharp contrast to the recitations of Claim 14, however, the cobalt layer 34 shown in FIG. 2 of Givens is not directly on the bottom and inner walls of the contact hole 28. Instead, the titanium layer 32 is disposed between the cobalt layer 34 and the bottom and inner walls of the contact hole 28.

For at least the foregoing reasons, Applicants respectfully submit that independent Claim 14 is patentable over Givens and that dependent Claims 15 - 22 are patentable at least by virtue of their depending from an allowable claim.

Independent Claim 23 is Patentable

Independent Claim 23 stands rejected under 35 U.S.C. §102(b) as being anticipated by Givens. Independent Claim 23 is directed to a method of forming a metal contact in a semiconductor device and recites, in part:

...
forming a cobalt silicide layer at the bottom of the contact hole while
forming a unitary plug that fills the contact hole on the cobalt layer.

This aspect of the present invention is illustrated, for example, in FIG. 6 where a unitary contact plug 215 is shown that fills the contact hole on the cobalt layer 211. As shown in FIG. 4 of Givens and as acknowledged on page 2 of the Office Action, multiple layers and materials are used to assist the aluminum contact 46 in filling the contact hole. Thus, Givens does not disclose or suggest a unitary plug that fills the contact hole as recited in Claim 23.

For at least the foregoing reasons, Applicants respectfully submit that independent Claim 23 is patentable over Givens and that dependent Claims 24 - 26 are patentable at least by virtue of their depending from an allowable claim.

In re: Park et al.
Serial No.: 10/615,362
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Page 6 of 6

CONCLUSION

In light of the above amendments and remarks, Applicants respectfully submit that the above-entitled application is now in condition for allowance. Favorable reconsideration of this application, as amended, is respectfully requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,


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